VIRTUAL REALITY AND IT'S APPLICATIONS IN EDUCATION

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Abstract: The difficulty of abstract thinking and comprehension can pose a challenge during the learning process. To address this, educational institutions around the world have started implementing advanced technology-based tools that cater to the needs of a diverse student population. Virtual Reality (VR) has been utilized for professional development for several years, moving beyond just the realm of gaming. In education, VR plays a crucial role by providing an engaging and captivating way for students to acquire knowledge. This study delves into the trend, opportunities, and potential associated with VR in education. The latest VR applications used in education, ranging from general to medical and engineering education, present various exciting opportunities. The study aims to contribute by outlining methods for creating scenarios and testing and validation procedures. Ultimately, this study will examine the future of VR in education and how it can enhance the learning experience.

Keywords: *Educational institutions, Advanced Technology-Based Tools, Diverse Student Population, Virtual Reality, Professional Development, Gaming, Engaging, Captivating, Knowledge Acquisition, Trend, Opportunities, Potential, Medical Education, Engineering Education.*

1. INTRODUCTION

The term Virtual Reality (VR) has different applications, but its original concept pertains to immersive VR, which fully immerses the user in a computer-generated world. This concept emerged in the late 1980s, and in immersive VR, users interact with a computer-generated world that is a virtual replica of the actual subject.

The primary objective of education is to equip students with the knowledge and skills necessary for life, work, and citizenship, ensuring they are qualified to meet society's needs. Immersive virtual reality is characterized by the replication of a full-scale environment that

matches human size. Therefore, educators play a critical role in enhancing graduates' skills and qualifications as they pursue their educational path.

Immersive virtual reality applications can be based on either real or abstract worlds. For instance, human anatomy represents a real-world example, while mathematical concepts reflect abstract scenarios. Both real and abstract worlds can be used to provide the best examples of immersive VR applications.

The study of human chemistry is a fascinating field that has piqued the interest of many. In recent years, Virtual Reality (VR) and Augmented Reality (AR) have been utilized to make learning about human emotions both enjoyable and effective. A game called InMind2 is a perfect example of how this technology can be used to teach students about the chemistry behind human emotions in an interactive and engaging way. In addition, VR technology is changing the way students explore and assess colleges they are interested in. A growing number of educational institutions now offer VR campus tours that allow students to explore campuses in immersive 360-degree environments. Regardless of their physical location, students can use VR to explore prospective schools with ease and get a realistic sense of what it would be like to attend. When we talk about Desktop and Mobile Platforms, we are referring to a broad range of components. These include computer hardware, operating systems, software that allows devices to interface with one another, frameworks and engines that run applications, as well as software tools for creating these applications.

The fundamental goal of the first VR platform is to furnish students with theoretical knowledge in various fields, including scientific theories, terminology, rules, facts, and dates. The potential practical applications of virtual reality models are immense, especially in situations where using animal organs can be hazardous or limited. For instance, the use of animal brains for dissection experiments is prohibited due to the risk of Bovine Spongiform Encephalopathy, also known as Mad Cow disease. This academic paper endeavors to assess the effectiveness of virtual reality in teaching and learning. Even though online education systems that incorporate VR are exceptional, they cannot completely replace the experience of attending a physical classroom. Although virtual classrooms allow students to watch video lessons and interact with professors and other students via text or video chat, they cannot duplicate the sense of being physically present in a classroom.

https://google._Virtual_Reality_and_Its_Applications_in_Education_Survey

2. LITERATURE REVIEW

Over the past two years, research has been conducted on the use of Immersive Virtual Reality (IVR) in education, with a focus on three search strings: "Immersive Virtual Reality Education," "Oculus Rift Education," and "Head Mounted Display Education."

The first search string provided insights into the general use of IVR in education, including CAVE-based approaches. The use of VR glasses or other Head Mounted Displays (HMD) with headphones can create a visceral feeling of being present in the simulated world.

However, for a complete immersion in a virtual world, all five senses should be involved, but most VR environments currently only address sight and hearing. Virtual reality is mostly linked with gaming and entertainment, but early on, its potential for training simulations was realized. In this research, the notion of educational virtual reality refers to specific VR environments and simulations that are used for educational purposes.

For instance, VR applications that are solely intended for use in any educational context. This also implies that any benefits of playing virtual reality games or related activities are not considered educational VR in this study.

One of the challenges related to new technology is always the initial learning curve. It will require time for both educators and learners to fully comprehend the virtual reality technology itself and the various VR applications that will be employed.

3. PROBLEM DEFINITION

Creating additional content is one of the significant challenges facing virtual reality in education. The issue lies in the fact that generating more content can be a costly endeavor, and not all educational institutions have the resources to employ a software development company to assist them in content creation. While many students may have the financial means to purchase a VR headset, there are still some who cannot afford one, depriving them of the opportunity to experience VR-based learning. The key challenge is to provide VR headsets to all students. Furthermore, cyber sickness is a genuine issue that many people fail to consider. It is similar to motion sickness and can hinder students' learning abilities. However, as technology advances, cyber sickness is decreasing. To ensure that students adapt to the sensation, additional investment is required. Educators must collaborate with companies to create the ideal VR classroom. There are also curricular concerns related to VR.

It is critical for teachers to integrate VR teaching closely with the curriculum and courses, rather than providing it as an isolated experience (Fransson et al., 2020). Although virtual reality has many benefits, they may be difficult to measure.

4. OBJECTIVE & SCOPE

- The idea is to take visually appealing multimedia concepts to the next level by making them more interactive for the learner.
- The ultimate goal of this is to investigate the potential of using cutting-edge virtual reality technology in the field of Business.
- The intricacies and expenses involved in the creation of virtual reality products, it was imperative to conduct a preliminary investigation.
- The primary objective of this study was to evaluate the efficiency of virtual reality in higher education. A suitable software and hardware package for human anatomy was chosen for this purpose.

5. RESEARCH METHODOLOGY

The generation of virtual images was accomplished by merging two real-life images that had a small difference in angle, using the special goggles that switched on and off at a rate of 30 frames per second. What was intriguing was that a few students were captivated by these images and were attempting to touch objects in front of the monitor, even though to the observer, it was nothing but an empty space. This multimedia system, however, produced spectacular views of the human anatomy.

There are ways were our Research Methodology give us a better result against the topic:

- The employment of virtual reality (VR) in education has numerous advantages. Although VR has been useful for quite some time in military and surgical training, this article primarily concentrates on the advantages of incorporating VR in primary education.

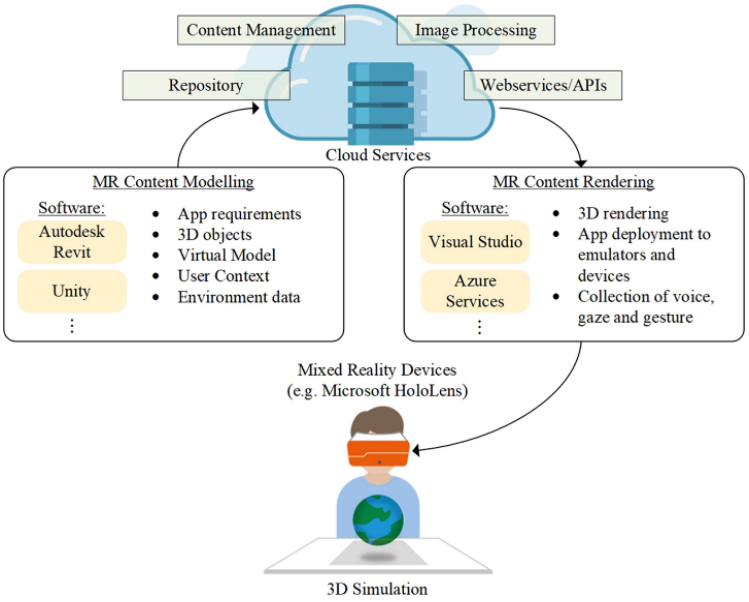

Figure 1: Mixed Reality Devices

- The VR encounter was an incredible experience that has positively impacted the ability to retain information. The use of visible examples in VR technology for learning purposes has made it easier to understand and absorb information compared to learning through textbooks. The incorporation of VR in education could potentially enhance and improve students' learning capacity.

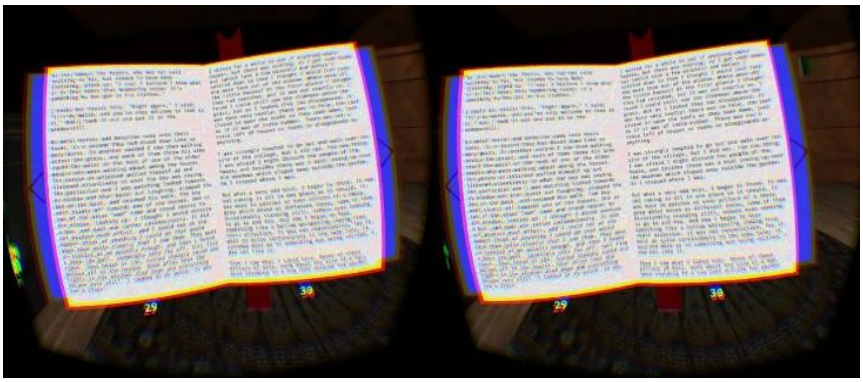

Figure 2: VR in education

- In addition to the ability to virtually visit inaccessible locations, VR technology can also be utilized to transport individuals to various destinations such as different countries. By taking a virtual field trip to historical sites, VR can be used to teach history in an immersive and engaging way.

Figure 3: Visual Experiences

- The immersive 3D visual experiences offer an enhanced level of engagement and learning compared to other methods. The use of VR technology in education can significantly improve knowledge retention and make the learning process enjoyable. It is essential that students have access to this technology as soon as possible to reap its benefits.

Figure 4: 3D Visual Experience

6. ANALYSIS & FINDING

An instructional-design theory is a conceptual structure that offers clear direction on how to improve learning and development (Reigeluth, 1999). Reigeluth notes that instructional-design theories share certain characteristics, including being design-oriented or goal-oriented, focusing on designing specific ways to achieve specific learning or developmental objectives. These theories offer a perspective rather than a descriptive approach, providing guidelines on the best methods to attain a given goal. It is well established that virtual reality has been used in various higher education fields for several decades, with military and medical fields being the primary users of VR simulations for training due to technological limitations. However, recent breakthroughs in affordable and mobile VR technology have increased the positive notes on VR in education. Although the benefits of VR in education are well understood, several practical problems & challenges remain; few downsides of VR have also been identified. There is a following table which shows that the perception provided by the students:-

Perception	Enjoyment	Speediness	Easiness	Real World View	Concept Building	Inclusion in Learning Materials
Strongly agree	21 (87.5)	6 (25)	12 (50)	20 (83.3)	15 (62.5)	21 (87.5)
Agree	3 (12.5)	16 (66.7)	11 (45.8)	3 (12.5)	9 (37.5)	3 (12.5)
Neutral	0	2 (8.3)	1 (4.2)	1 (4.2)	0	0
Disagree	0	0	0	0	0	0
Strongly disagree	0	0	0	0	0	0
No. of students	24 (100)	24 (100)	24 (100)	24 (100)	24 (100)	24 (100)

Figure 5: Tabular format of the perception provided by the students

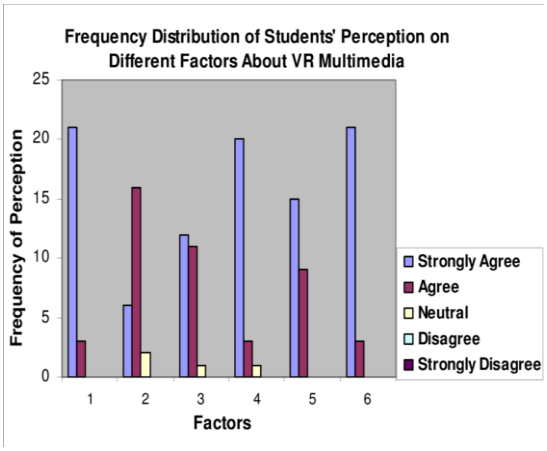

Figure 6: Graphical View

7. LIMITATIONS & FUTURE SCOPE

In the modern world, virtual reality is revolutionizing education in terms of teaching, learning, and communication. VR enables students to fully immerse themselves in the learning process, removing distractions and igniting their curiosity for further knowledge. It is also an effective tool for promoting creative learning. The literature increasingly recognizes the potential benefits of VR in meeting the unique needs of the learning process. Some studies suggest that VR can help children with autism spectrum disorder to improve their behavioral, communication, and social skills. However, the high cost of developing or purchasing a VR system remains a significant obstacle. Virtual reality has the potential to facilitate more effective learning at a lower cost and in less time than traditional learning methods. With VR, learners can practice more repetitions, especially in expensive, rare, or hazardous environments. Moreover, VR-based training can help learners learn from their mistakes. By tracking all of the trainee's actions and inputs, instructors can provide

individualized and tailored feedback at a reduced cost. Thus, VR can be an effective learning tool in any industry, and its real-world applications are catching up with academic research predictions of better and faster learning. Nevertheless, incorporating VR into a training program does not guarantee quality improvements. The coming years will undoubtedly bring both VR success stories and failures. sides of using VR have also been identified.

8. CONCLUSION

A teacher is an essential filter of information for students, ensuring that what they learn is relevant and accurate. With advancements in technology, virtual reality has become more accessible and affordable, making it a valuable tool for teaching. However, challenges still remain. One critical factor is the rarity of knowledge, which limits learning opportunities. Virtual reality can address this by providing immersive experiences that replicate physical environments. Another advantage of VR is the ability to incorporate more realistic images and visual features, which can further enhance learning. While VR can be useful for complex tasks, there may be more cost-effective ways to teach simpler concepts. Overall, virtual reality has enormous potential in education and can greatly benefit the future of learning.

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